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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/992,784	11/06/2001	John Robert Lockemeyer	TH1396N (US)	6996
7590	02/13/2004			
Beverlee G. Steinberg Shell Oil Company Legal - Intellectual Property P.O. Box 2463 Houston, TX 77252-2463			EXAMINER	ILDEBRANDO, CHRISTINA A
			ART UNIT	PAPER NUMBER
			1725	

DATE MAILED: 02/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

<i>Office Action Summary</i>	Application No.	Applicant(s)
	09/992,784	LOCKEMEYER, JOHN ROBERT
	Examiner Christina Ildebrando	Art Unit 1725

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) Responsive to communication(s) filed on 02 December 2003.

2a) This action is **FINAL**.      2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4) Claim(s) 1-49 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 1-49 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All    b) Some \* c) None of:  
1. Certified copies of the priority documents have been received.  
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) Notice of References Cited (PTO-892)  
2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_

4) Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_

5) Notice of Informal Patent Application (PTO-152)  
6) Other: \_\_\_\_\_

## **DETAILED ACTION**

1. In view of the Appeal Brief filed on December 2, 2003, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

### ***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 4, 9-10, 13, 17, 22-28, 32, 37, 41, and 46-49 are rejected under 35 U.S.C. 102(b) as being anticipated by Thorsteinson et al.

Thorsteinson et al. (US 5,187,140) discloses a catalyst composition useful in the epoxidation of ethylene to ethylene oxide. The catalyst composition comprises a support and silver as the active metal (column 6, lines 24-30). The catalyst contains a

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high concentration of silver in the range of from about 25-45 percent by weight (column 6, lines 51-58). The silver is supported on a carrier having a BET surface area in the range of from about 0.7 m<sup>2</sup>/g to about 10 m<sup>2</sup>/g (column 7, lines 55-60). Preferred carriers include alpha alumina (column 8, lines 5-20).

The catalyst further contains at least one or more promoters in an amount sufficient to enhance the efficiency and/or activity of the catalyst (column 11, lines 25-30). Preferred promoters include halides, e.g. fluorides and chlorides, and the oxyanions of the elements other than oxygen having an atomic number of 5-83 of groups 3b-7b and 3a-7a of the Periodic Table (column 11, lines 32-38). Preferred promoters include oxyanions of nitrogen, sulfur, manganese, tantalum, molybdenum, tungsten, and rhenium (column 11, lines 38-40). The catalyst contains alkali metal and/or alkaline earth metals as the cationic promoter (column 11, lines 49-50). Suitable examples include lithium, sodium, potassium, rubidium, cesium, beryllium, magnesium, calcium, strontium and barium (column 11, lines 50-55). The concentration of promoters may vary from 0.0005-1 weight percent and preferably lies in the range of 10-4000ppm (column 12, lines 12-35).

Thorsteinson et al. does not specifically disclose that the carrier has a sodium solubilization rate of no greater than 5ppmw/5 minutes. However, Thorsteinson et al. teaches a carrier "AJ" which is an alpha alumina carrier which is washed according to the following procedure: 30 minutes in boiling water, 6 times washed at 25 degrees C, each times 1000 cc carrier is washed with 1200 cc water, and dried at 300 degrees C (column 46, lines 5-11). The carrier has 51ppm of leachable sodium impurities (column

46, lines 14-20). The carrier is impregnated with silver and a cesium sulfate solution to obtain a catalyst (columns 55-56). The solution of cesium sulfate is considered to meet the claimed sulfur promoter. Given the low concentration of leachable sodium, it is considered that the treatment will inherently result in the solubilization rate that is instantly claimed. When the examiner has reason to believe that the functional language asserted to be critical for establishing novelty in claimed subject matter may in fact be an inherent characteristic of the prior art, the burden of proof is shifted to Applicants to prove that the subject matter shown in the prior art does not possess the characteristics relied upon. *In re Fitzgerald et al.* 205 USPQ 594. Therefore, it is the position of the examiner that the reference specifically exemplifies an embodiment which anticipates the claims.

As each and every element of the claimed invention is taught in the prior art as recited above, the claims are anticipated by Thorsteinson et al.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-5, 8-10, 13-18, 21-33, 36-42, and 45-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thorsteinson et al.

Thorsteinson et al. (US 5,187,140) discloses a catalyst composition useful in the epoxidation of ethylene to ethylene oxide. The catalyst composition comprises a support and silver as the active metal (column 6, lines 24-30). The catalyst contains a high concentration of silver in the range of from about 25-45 percent by weight (column 6, lines 51-58). The silver is supported on a carrier having a BET surface area in the range of from about 0.7 m<sup>2</sup>/g to about 10 m<sup>2</sup>/g (column 7, lines 55-60). Preferred carriers include alpha alumina (column 8, lines 5-20).

Thorsteinson et al. does not specifically disclose that the carrier has a sodium solubilization rate of no greater than 5ppmw/5 minutes. However, Thorsteinson et al. teaches a carrier "AJ" which is an alpha alumina carrier which is washed according to the following procedure: 30 minutes in boiling water, 6 times washed at 25 degrees C, each times 1000 cc carrier is washed with 1200 cc water, and dried at 300 degrees C (column 46, lines 5-11). The carrier has 51ppm of leachable sodium impurities (column 46, lines 14-20). The carrier is impregnated with silver and a cesium sulfate solution to obtain a catalyst (columns 55-56). Given the low concentration of leachable sodium, it is considered that the treatment will inherently result in the solubilization rate that is instantly claimed. When the examiner has reason to believe that the functional language asserted to be critical for establishing novelty in claimed subject matter may in fact be an inherent characteristic of the prior art, the burden of proof is shifted to Applicants to prove that the subject matter shown in the prior art does not possess the characteristics relied upon. *In re Fitzgerald et al.* 205 USPQ 594. Therefore, it is the position of the

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examiner that the reference specifically exemplifies an embodiment which anticipates the claims.

The difference between the reference and the instant claims is that the reference does not specifically disclose the combination of carrier AJ with one or more promoters selected from phosphorus, boron, fluorine, lithium, sodium, rubidium, Group IIA through Group VIII metals, and rare earth metals, as required by the instant claims. [Note the combination of cesium sulfate in combination with carrier AJ is considered to anticipate the instant claims when sulfur is the promoter.]

However, Thorsteinson et al. does disclose that the catalyst contains at least one or more promoters in an amount sufficient to enhance the efficiency and/or activity of the catalyst (column 11, lines 25-30). Preferred promoters include halides, e.g. fluorides and chlorides, and the oxyanions of the elements other than oxygen having an atomic number of 5-83 of groups 3b-7b and 3a-7a of the Periodic Table (column 11, lines 32-38). Preferred promoters include oxyanions of nitrogen, sulfur, manganese, tantalum, molybdenum, tungsten, and rhenium (column 11, lines 38-40). The catalyst contains alkali metal and/or alkaline earth metals as the cationic promoter (column 11, lines 49-50). Suitable examples include lithium, sodium, potassium, rubidium, cesium, beryllium, magnesium, calcium, strontium and barium (column 11, lines 50-55). The concentration of promoters may vary from 0.0005-1 weight percent and preferably lies in the range of 10-4000ppm (column 12, lines 12-35). The reference further teaches that the alkali metal cations are preferably used in combination with cesium (column 11, lines 55-60).

Thus, the reference discloses that the cesium sulfate exemplified in combination with the carrier AJ to be functionally equivalent to the promoters and combinations required by the instant claims. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have substituted the cerium sulfate supported on carrier AJ with any of the other, functionally equivalent promoters taught by the reference, with a reasonable expectation of success.

6. Claims 6-7, 19-20, 34-35, and 43-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thorsteinson et al. as applied to claims 1-5, 8-10, 13-18, 21-33, 36-42, and 45-49 above, and further in view of Matusz et al.

The teachings of Thorsteinson et al. are applied as above for claims 1-5, 8-10, 13-18, 21-33, 36-42, and 45-49.

The reference differs from the instant claims in that Thorsteinson et al. does not teach the use of rare earth or group VIII metals as promoters.

Matusz (US 5,739,075) discloses silver a catalyst useful for the production of ethylene oxide from ethylene. The catalyst comprises silver and promoter metals, including a rare earth metal, a metal selected from the group of alkaline earth metals, group VIII metals, and mixtures thereof, rhenium and/or sulfur, molybdenum, tungsten, chromium, phosphorus, boron, and mixtures thereof (column 2, lines 13-28). The catalyst is supported on alpha-alumina (column 4, lines 30-36).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the invention of Thorsteinson et al. to include the additional promoters taught by Matusz. The group of metals taught by Matusz includes

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promoters taught by Thorsteinson et al. which suggests that they are functionally equivalent. Because of the art recognized functional equivalence of the promoters taught by Thorsteinson et al. to the promoters taught by Matusz in the production of ethylene oxide from ethylene, it would have been obvious to one of ordinary skill to have substituted one known component for the other in the catalyst taught by Thorsteinson et al.

7. Claims 1-6, 9-19, 22-34, 37-43, and 46-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Finch et al. in view of Notermann et al.

Finch et al. (US 2,424,083) discloses a silver catalyst useful for the direct catalytic oxidation of olefins to olefin oxides. The catalyst comprises silver on a support which is preferably alumina (column 3, lines 35-40). The catalyst may further comprise promoters including gold, copper, platinum, nickel, iron, alkali metals, and alkaline earth metals (column 4, lines 30-45). The metals are deposited by impregnation in a solution comprising a suitable silver salt, an alkali metal hydroxide, such as NaOH, ammonium hydroxide, and a reducing agent (column 5, lines 1-10). The alkali metal hydroxide is a basic compound which is considered to lower the hydrogen ion activity of the impregnating solution.

The amount of silver deposited is 0.5-2 g per 100 cm<sup>3</sup> of catalyst (column 3, lines 15-20). The amount of promoter deposited may be prepared by adding the desired or optimum quantity, i.e. up to 8% of the amount of silver deposited (column 4, lines 45-50). It would have been obvious to one having ordinary skill in the art at the time the invention was made to choose the instantly claimed ranges through process

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optimization, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See *In re Boesch*, 205 USPQ 215.

Finch et al. does not disclose that the support is treated such that the sodium solubilization rate is no greater than 5 ppmw per 5 minutes.

Notermann et al. (US 4,994,587) discloses a catalytic system for epoxidation of alkenes. The catalyst comprises silver on a solid support (column 11, lines 55-60). The support has less than about 50 and most frequently less than about 20 ppm of leachable sodium (column 11, lines 60-63). A preferred support material is alpha alumina (column 13, lines 1-2).

Notermann et al. teaches that improved results are obtained by using a support wherein the support contains low levels of leachable sodium (column 13, lines 28-35). Notermann et al. teaches that the presence of leachable sodium exhibits deactivating and effective life-shortening effects on the catalytic system (column 11, lines 18-25). The low sodium support can be prepared by any methods suitable for removing sodium from a solid (column 13, lines 40-45). Typically the techniques involve extraction and/or volatilization of the sodium present (column 13, lines 50-68). Prepared supports have BET surface areas of 1.56 m<sup>2</sup>/g (column 23, Example 1).

Notermann et al. does not specifically disclose that the sodium solubilization rate of the carrier is no greater than 5 ppmw/5 minutes. However, it is considered that because Notermann et al. teaches removing leachable sodium from the carrier material, the resulting material will have the solubilization rate instantly claimed.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute the carrier taught by Finch et al. with the carrier taught by Notermann et al. One of ordinary skill would have been motivated to do so in light of the suggestion of Notermann et al. that the use the low sodium alumina carrier will obtain a catalyst with improved properties and avoid the deleterious effects of leachable sodium. Since both catalysts can be used to convert ethylene to ethylene oxide, one would have reasonable expectation of success from the combination.

8. Claims 7-8, 20-21, 35-36, and 44-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Finch et al. in view of Notermann et al. as applied to claims 1-6, 9-19, 22-34, 37-43, and 46-49 above, and further in view of Matusz.

The modified disclosure of Finch et al. is applied as above for claims 1-6, 9-19, 22-34, 37-43, and 46-49.

The reference differs from the instant claims in that the modified disclosure of Finch et al. further does not teach the use of rare earth or rhenium metals as promoters.

Matusz (US 5,739,075) discloses silver a catalyst useful for the production of ethylene oxide from ethylene. The catalyst comprises silver and promoter metals, including a rare earth metal, a metal selected from the group of alkaline earth metals, group VIII metals, and mixtures thereof, rhenium and/or sulfur, molybdenum, tungsten, chromium, phosphorus, boron, and mixtures thereof (column 2, lines 13-28). The catalyst is supported on alpha-alumina (column 4, lines 30-36).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify the invention of Finch et al. to include the

additional promoters taught by Matusz. The group of metals taught by Matusz includes promoters taught by Finch et al. which suggests that they are functionally equivalent. Because of the art recognized functional equivalence of the promoters taught by Finch et al. to the promoters taught by Matusz in the production of ethylene oxide from ethylene, it would have been obvious to one of ordinary skill to have substituted one known component for the other in the catalyst taught by Finch et al.

***Response to Arguments***

9. Applicant's arguments, see pages 3-7 of the Appeal Brief, filed December 2, 2003, with respect to the rejection of claims 1-5, 8-10, 13-18, 21-33, 36-42, and 45-49 under 35 USC 102(b) over Thorsteinson have been fully considered and are persuasive. Therefore, the rejection has been withdrawn in favor of the revised rejection under 35 USC 102(b) (anticipation of the species sulfur in combination with the carrier AJ) and a new rejection under 35 USC 103(a) (obvious to substitute any of the promoters taught by the reference, including those required by the claims, for the cesium sulfate promoter deposited on Carrier AJ in light of their disclosed functional equivalence).

10. Applicant's arguments filed December 2, 2003 (pages 7-11 of the Appeal Brief) have been fully considered but they are not persuasive.

Applicant first argues that the Examiner has not provided sufficient reasoning to support the conclusion that the claimed sodium solubilization rate flows from the teaching of Notermann et al. However, the examiner disagrees. Notermann teaches that leachable impurities that are present in the carrier should be removed. The reference

details that sodium may be removed by an extraction and/or volatilization procedure, as is recited in the instant claims. Therefore, it is considered that, given the low level of leachable sodium in the carrier and the treatment described by the reference, the carrier would inherently possess a sodium solubilization rate as recited in the instant claims. The examiner submits that the evidence described above is sufficient to shift the burden to the applicant to establish that the characteristic is not inherent. Applicant has not met this burden.

Applicant further argues that the combination of references teaches away from the claimed invention. Applicant points to column 11 of the Notermann et al. reference as evidence that the low levels of leachable sodium applies only to cases where CO<sub>2</sub> is present in the system. Applicant further argues that because Finch does not teach or suggest that CO<sub>2</sub> is present in the system, there is no motivation to combine the teachings of the references.

These arguments have been considered but are not persuasive. The examiner notes that the description in column 11 refers to the prior art and common problems encountered. With reference to column 1, it appears from equations (1) and (2) that CO<sub>2</sub> is an undesired by-product of the epoxidation reaction. Therefore, although Finch does not discuss the presence of CO<sub>2</sub> in the reference, one of ordinary skill would recognize that it would necessarily be there. Notermann et al. also recognizes that sodium may be a promoter for the reaction – in fact, the reference teaches in those cases it is important to use the low sodium support. Refer to column 11, lines 24-35 in particular. Therefore, it is the position of the examiner that it would have been obvious to one having ordinary

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skill to combine the teachings of the reference to overcome the problems of the prior art (recognized by Notermann et al.) to arrive at the claimed invention.

### ***Conclusion***

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christina Ildebrando whose telephone number is (571) 272-1176. The examiner can normally be reached on Monday-Friday, 7:30-5, with Alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on (571) 272-1171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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